SANTA CLARA COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

ANNUAL SURVEY REPORT

on

GROUND WATER CONDITIONS

1963

(1961-62)

March 1963

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anta clara county
FLOOD CONTROL AND WATER CONSERVATION DISTRICT

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70 WEST ROSA STREET
SAN JOSE 10, CALIFORNIA
CYPRESS 8-2031

11 March 1963

Honorable Board of Supervisors
Santa Clara County Flood Control and
Water Conservation District
70 West Rosa Street
San Jose 10, California

Gentlemen:

I am pleased to transmit to you the District Engineer's "Annual Survey Report on Ground Water Conditions" in the Santa Clara County Flood Control and Water Conservation District for 1963. The report was prepared under the authority of Section 26.5 of the District Act and is the first of an annual series required as a prerequisite to the levy of a ground water charge for the production of water from the ground water supplies within a zone or zones of the district.

The report finds that an overdraft condition exists throughout the major ground water basins of Santa Clara County. The average seasonal overdraft for the current (1962-63) water year was estimated to be 40,600 acre-feet for Zone W-1 (which covers most of the Santa Clara Valley Ground Water Basin), 400 acre-feet for the Coyote Ground Water Basin, and 10,800 acre-feet for the Llagas Ground Water Basin. The accumulated overdraft as of the end of the preceding (1961-62) water year was estimated to be 662,000 acre-feet for the Zone W-1, zero acre-feet for the Coyote Ground Water Basin, and 25,000 acre-feet for the Llagas Ground Water Basin. There is no hope of any major alleviation of these annual overdrafts or amounts of accumulated overdrafts until supplemental imported water supplies are available.

The report recommends continued engineering design on the in-county distribution system in order that it may be completed and operational when water is available from the South Bay Aqueduct. It also recommends that a county-wide tax of five cents per $100 assessed valuation be levied in the ensuing (1963-64) water year to defray the allocated costs of the South Bay Aqueduct, and that no ground water charge be levied in the ensuing (1963-64) water year. The in-county distribution system, engineering design and construction expenses for the ensuing (1963-64) water year will be financed from the sale of bonds.

I concur in the findings and recommendations presented in this report.

Sincerely yours,

Donald K Currlin
Manager-Counsel

Acknowledgement

Valuable assistance and much of the data used in this investigation were contirbuted by agencies of the State of California and of the County of Santa Clara, by cities, and by private companies and individuals. This cooperation is gratefully acknowledged.

Special mention is made of the helpful cooperation of the Santa Clara Valley Water Conservation District, the South Santa Clara Valley Water Conservation District, the Sanitation Districts of Santa Clara County, the San Jose Water Works, the City of Sunnyvale, and the Santa Clara County Planning Department.

SANTA CLARA COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

Board of Supervisors
Ralph H. Mehrkens, Chairman
Ed. R. Levin
Sig Sanchez
Sam P. DellaMaggiore
Martin Spangler, Sr.

Donald K. Currlin, Manager-Counsel

This report was prepared under the direction of

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INTRODUCTION

This is the first annual survey report on ground water conditions in the Santa Clara County Flood Control and Water Conservation District and the Zones thereof. It has been prepared in accordance with the requirements of Section 26.5 of the District Act.

The purpose of this report is to inform the Board of Supervisors of the ground water conditions in the District during the preceding water year*, 1961-62, and to assist the Board in its determinations of water supply and water use as of the last day of this water year, 1962-63, and prediction of water supply and water use for the ensuing water year, 1963-64. This information will provide a basis for the Board's determination of ground water charges for the ensuing water year, 1963-64.

The Santa Clara County Flood Control and Water Conservation District includes all of Santa Clara County. Within the County three major interconnected ground water basins have been delineated. These ground water basins are shown on Plate 1 "Ground Water Basins and Water Importation Zones in Santa Clara County," and have been named "Santa Clara Valley Ground Water Basin," "Coyote Ground Water Basin," and "Llagas Ground Water Basin." For the purpose of estimating water supply amounts, it was assumed that the valley floor was the immediate ground water basin and the water bearing hill areas contribute to the water supply through a computed subsurface inflow; therefore, the values of water supply and ground water basin areas given herein relate to the valley floor.

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*Water Year is defined in Section 26.1 of the District Act as "July 1st of one calendar year to June 30th of the following calendar year."

The Santa Clara Valley Ground Water Basin is the most extensive, occupying about 173,000 acres between San Francisco Bay and the Lower Gorge on Coyote Creek just north of Coyote. It is also the most utilized ground water source, providing about 250,000 acre-feet of ground water extractions in 1961-62. The Santa Clara Valley Ground Water Basin is separated from the Coyote Ground Water Basin by a constriction in the bedrock, which is essentially non-water-bearing, at "The Narrows," a point just north of the small community of Coyote. Other than the constriction in cross-sectional area of the water bearing sediments there appears to be no barrier to the movement of ground water from one ground water basin to the other.

The Coyote Ground Water Basin is the smallest of the three major basins; it occupies about 9,000 acres between Coyote on the north and Cochran Road on the south. There is a bedrock high or divide located just north of Morgan Hill which decreases the thickness of the water bearing sediments. Cochran Road generally follows this bedrock high which separates the Coyote Ground Water Basin from the Llagas Ground Water Basin to the south. Other than the reduction in the cross-sectional area of the water bearing sediments there appears to be no barrier to the movement of ground water from one basin to the other. The Coyote Ground Water Basin is recharged primarily by the flows of Coyote Creek and ground water moves out of this basin as subsurface flows both to the north through "The Narrows" and to the south beneath Cochran Road. About 15,000 acre-feet of ground water were extracted in 1961-62 for use in this basin.

The Llagas Ground Water Basin is the most southerly one in Santa Clara County. It extends from Cochran Road on the north to the Pajaro River on the south and occupies about 57,000 acres. In 1961-62 about 73,000 acre-feet of ground water were extracted from this basin for municipal and agricultural purposes.

The only water importation zone in Santa Clara County overlies essentially all of the Santa Clara Valley Ground Water Basin. This Zone was formed on September 11, 1962 and is known as Zone W-1. Its boundaries are shown on Plate 1. Coterminus with this Zone, a second Zone W-2 was formed on February 11, 1963 wherein a ground water charge for the production of water from the ground water supplies within that zone can be levied.

Precipitation and runoff measurements made at sampling stations in Santa Clara County indicate that the water year of 1961-62 was slightly below normal. Seasonal precipitation recorded by the U. S. Weather Bureau station at San Jose was about 90 percent of the long-time mean of 14.01 inches while the precipitation station at Gilroy recorded almost 100 percent of the long-time mean of 20.01 inches.

Although runoff from streams originating on the west valley slopes produced runoff volumes close to the long-time average, production from streams originating on the east side of the valley was below normal. Therefore, total runoff into the valley areas available for recharge into the ground water basins was below normal for the Santa Clara Valley and Coyote Ground Water Basins; however, it was close to normal for the Llagas Ground Water Basin. The total water stored in surface reservoirs during the 1961-62 water year for recharge in the Santa Clara Valley and Coyote Ground Water Basins was 41,900 acre-feet and that for the Llagas Ground Water Basin was 17,000 acre-feet.

In summary of the information contained in this report the total surface and subsurface water supply to Zone W-1 of the Santa Clara Valley Ground Water Basin during the 1961-62 water year was about 439,000 acre-feet, for the Coyote Creek Ground Water Basin it was 86,000 acre-feet, and about 166,000 acre-feet in the Llagas Ground Water Basin. The seasonal overdraft, which is the mean seasonal change in storage based on the long term average conditions of water supply under present conditions, and the ground water extractions were estimated for each zone or ground water basin in the district. These estimates are:

GROUND WATER BASIN	OVERDRAFT (1962 conditions) in acre-feet	GROUND WATER PRODUCTION (1962) in acre-feet
Zone W-1	41,700	250,000
Coyote	Zero	15,000
Llagas	9,500	73,000

The accumulated overdraft in Zone W-1 as of the last day of the 1961-62 water year was based on the change in ground water storage between 1942 and the present. It was estimated to be about 662,000 acre-feet and the average annual overdraft for the immediate past ten years was estimated to be 19,500 acre-feet.

In the management of ground water basins, the estimates of overdraft obtained within the assumed set of conditions can be used as a guide in reducing the amount of ground water extraction from these basins and in estimating the needs for imported water. Any reduction in the amount of extractions from the ground water basins to decrease or overcome the seasonal overdraft would require an equal amount of supplemental imported water. Estimates of the projected overdraft for each zone or ground water basin of the district in the water years of 1962-63 and 1963-64 are:

GROUND WATER BASIN	1962-63 OVERDRAFT in acre-feet	1963-64 OVERDRAFT in acre-feet
North Zone	40,600	40,200
Coyote	400	700
Llagas	10,800	12,100

Based on the 1963-64 estimates of overdraft about 53,000 acre-feet of supplemental water should be imported if available and, in addition, about 20,000 acre-feet of water should be imported to help alleviate the accumulated overdraft (planned elimination in 30 years).

WATER SUPPLY AND WATER DISPOSAL

Within any water year the essential elements of water supply to Santa Clara County are precipitation on the land area, surface and subsurface inflow, and surface import.

This water supply is disposed of by consumptive use including evaporation, surface and subsurface outflow, and surface export. These items of water supply and disposal will be discussed in the following paragraphs in order to develop the information essential to a determination of ground water overdraft, if any. The discussions attempt to relate the long time average seasonal amount and the average seasonal amount under the present (1962) conditions. These two averages permit a determination of the affects of today's activities of man if allowed to continue for a long time period.

Precipitation

Precipitation is the source of all water available for beneficial use in Santa Clara County. Within the county it varies widely in total amount from place to place, from month to month, from year to year, and from one period of years to another. The average seasonal amount of precipitation varies from more than 45 inches along the crest of the Santa Cruz Mountains to less than 14 inches near San Francisco Bay.

The precipitation at San Jose was considered to be representative of the seasonal rainfall variations in the valley areas of Santa Clara County. These historical variations are shown on Plate 2 "Recorded Seasonal Precipitation and Accumulated Departure from the Average at San Jose." The curve of accumulated departure from the average seasonal precipitation on Plate 2 illustrates the historical successive periods of wetness (ascending curve) and dryness (descending curve).

The volume of precipitation that falls directly on the surface of the ground water basin is an item of direct water supply to that basin. The amount of precipitation was estimated from the product of long time average seasonal rainfall and the area of the ground water basin or zone. The resulting values, which are estimates for the valley floor only, were 219,900 acre-feet for Zone W-1, 14,500 acre-feet for the Coyote Ground Water Basin, and 94,100 acre-feet for the Llagas Ground Water Basin. Precipitation on the hill areas within the ground water basins but outside of the valley floor area is accounted for as unmeasured stream flow or subsurface flow from the adjacent hills to the valley floor area.

Surface Inflow and Outflow

The surface water inflow, or runoff, to the zones or ground water basins of Santa Clara County is a direct result of precipitation on the hill and mountain lands of the County. This water supply varies considerably, following the same trends as the rainfall. After the demands for evaporation, vegetative consumptive use, and deep percolation have been satisfied, the remaining volume of rainfall discharges over the surface of the ground as stream flow. In Santa Clara County there is about 174,000 acre-feet of conservation storage available in surface reservoirs and through this storage portions of the stream flow runoff are made available as a source of water supply. Other portions of the runoff infiltrate naturally through the stream beds to the ground water reservoir or are used consumptively by native vegetation along the stream banks; the remaining volume of runoff discharges out of the County.

The long time average seasonal runoff into and out of the zones or ground water basins of Santa Clara County is given in Table 1. The average seasonal surface inflow and outflow under present (1962) conditions is also given in Table 1.

TABLE 1

SURFACE RUNOFF INTO AND OUTFLOW FROM ZONES OR GROUND WATER BASINS OF SANTA CLARA COUNTY

in Acre-Feet

Ground Water Basin	Long Time Average Seasonal		Average-Seasonal Under Present (1962) Conditions	
	Runoff Into	Outflow From	Runoff Into	Outflow From
Zone W-1	171,900	99,000	171,900	55,000
Coyote	67,000	55,100	67,000	45,100
Llagas	57,100	49,000	57,100	36,600

Under present (1962) conditions the surface inflow to the zones and ground water basins of Santa Clara County remain the same as the long time average seasonal runoff since the works of man have little effect on the runoff from the mountains. However, the works of man such as conservation reservoirs decrease the amount of surface outflow from the areas by holding back flood waters for future use while other works such as streets and roofs in urban areas generally increases the amount of surface runoff by increasing the impervious areas and reducing the opportunities for deep percolation. The estimated changes in surface outflow as a result of the activities of man between the end of the base period and the 1962 season under present (1962) conditions are indicated by the difference between the figures in Table 1.

Subsurface Inflow and Outflow

Subsurface inflow constitutes a part of the water supplies utilized in all of the zones and ground water basins of the County of Santa Clara. Subsurface inflow into the Santa Clara Valley Ground Water Basin occurs from the adjacent hills, the Coyote Ground Water Basin, and from the Peninsula north of Adobe Creek when the ground water table in that area slopes toward the south. In the Llagas Ground Water Basin subsurface water enters from the Coyote Ground Water Basin to the north and from the adjacent hills.

Based on data contained in Bulletin 7 of the California Department of Water Resources, it was estimated that the average seasonal subsurface inflow from the adjacent hills into the Santa Clara Valley Ground Water Basin was about 13,000 acre-feet. In addition, the average seasonal subsurface inflow from the Coyote Ground Water Basin to the south was estimated to be 9,300 acre-feet. There is no subsurface outflow from the Santa Clara Valley Ground Water Basin since the ground water contours indicate subsurface inflow from all possible points of outflow, except the Palo Alto area where the ground water contours indicate no movement of water into or out of the basin. The subsurface inflow from San Francisco Bay is treated as a change in ground water storage since this inflow is a potential source of ground water quality degradation, an undesirable feature.

The estimated average seasonal subsurface inflow to the Coyote Ground Water Basin was about 3,200 acre-feet from the adjacent hills. The average seasonal subsurface outflow from this basin was estimated to be 9,300 acre-feet to the north (to Santa Clara Valley Ground Water Basin) and 2,300 acre-feet to the south (to Llagas Ground Water Basin).

The estimated average seasonal subsurface inflow to the Llagas Ground Water Basin was about 10,500 acre-feet from the adjacent hills and 2,300 acre-feet from the Coyote Ground Water Basin. The historical ground water contours demonstrate that there is a subsurface outflow from the Llagas Ground Water Basin to the Pajaro River and to the basins downstream. This subsurface outflow was estimated to be about 15,100 acre-feet on an average seasonal basis.

By extracting from or augmenting recharge to the ground water reservoir, man can influence the average seasonal amounts of subsurface inflow to or outflow from the ground water basins. For the purposes of this study it was assumed that under present (1962) conditions these influences had little or no effect on the subsurface inflow from the adjacent hills or the outflow from the Santa Clara Valley and Llagas basins. However, near the common boundaries of the ground water basins this influence has changed the configuration of the ground water contours sufficiently to result in a change of the average seasonal subsurface inflow or outflow under present (1962) conditions. The resulting average seasonal subsurface inflow under present (1962) conditions to the zones and ground water basins of Santa Clara County is presented in Table 2.

TABLE 2

AVERAGE SEASONAL SUBSURFACE INFLOW AND OUTFLOW TO ZONES OR GROUND WATER BASINS OF SANTA CLARA COUNTY

in Acre-Feet

Ground Water Basin	Long-Time Average Seasonal		Average Seasonal Under Present (1962) Conditions	
	Subsurface Inflow	Subsurface Outflow	Subsurface Inflow	Subsurface Outflow
Zone W-1	22,300	0	27,800	0
Coyote	3,200	11,600	3,200	18,500
Llagas	12,800	15,100	14,200	15,100

Imported Water

An additional supply of water is provided to Santa Clara County by the purchase of imported water from the San Francisco Water Department by the cities of Milpitas, Mountain View, Palo Alto, and Sunnyvale. This importation grew from 860 acre-feet in 1939 to 16,000 acre-feet in 1962. Of this amount of imported water, 10,400 acre-feet was considered to be delivered and used in Zone W-1. There was no other imported water utilized in the zones or ground water basins of Santa Clara County in 1962.

Consumptive Use

The primary item of disposal is the consumptive use in homes, in industry, by agriculture, and by native vegetation; it is also the item of water disposal that is most affected by the activities of man. The average seasonal consumptive use of applied water and precipitation within the zones or ground water basins of Santa Clara County for the water year 1961-62 was estimated to be about 341,900 acre-feet in Zone W-1, 21,600 acre-feet in the Coyote Ground Water Basin, and 120,600 acre-feet in the Llagas Ground Water Basin. These estimates were based on detailed land use studies and unit values of consumptive use. The information on land use was obtained from surveys conducted in 1961-62 by the Santa Clara County Planning Department. The unit water use values associated with the various land use classes were derived from the values presented in Bulletin 7. The various classes of land use, acreages of each, the appropriate unit water use value, and the total estimated consumptive use for 1961-62 are presented in Table 3 for each zone or ground water basin in Santa Clara County. Table 3 also contains the average seasonal consumptive use for the base period as determined in Bulletin 7. The difference in the average seasonal consumptive use and the consumptive use in 1961-62 is indicative of the activities of man.

Water Export

There is no direct export of water from Santa Clara County. Sewage is disposed of from the urban centers of the north county area to San Francisco Bay. The average seasonal discharge of sewage from Zone W-1 during the base period was about 12,000 acre-feet and in 1961-62 it was about 57,500 acre-feet. This large increase is indicative of the rapid urban expansion that has taken place. There is no sewage outflow from the Coyote Ground Water Basin.

In the Llagas Ground Water Basin, sewage from the City of Gilroy is treated and the effluent used for irrigation. However, the effluent surplus to the irrigation needs is discharged to Miller Slough and out of the basin. The average seasonal discharge of sewage from the Llagas Ground Water Basin during the base period was estimated to be about 500 acre-feet and

TABLE 3

LAND USE AREAS, UNIT VALUES OF CONSUMPTIVE USE, AND CONSUMPTIVE USE IN THE ZONES OR GROUND WATER BASINS, OF SANTA CLARA COUNTY

Zone W-1

Land Use	Area in Acres in 1961-62	Unit Consumptive Water Use In Feet	1961-62 Consumptive Use In Acre-Feet	Base Period Average Consumptive Use In Acre-Feet
Urban	85,900	1.9	163,300	20,600
Irrigated Land	68,500	2.5	171,200	211,200
Non-Irrigated Land	4,000	1.6	6,400	71,500
Farmstead	500	2.0	1,000	3,400
Miscellaneous	---	---	---	7,800
TOTAL	158,900*		341,900	314,500

Coyote Ground Water Basin

Land Use	Area in Acres in 1961-62	Unit Consumptive Water Use In Feet	1961-62 Consumptive Use In Acre-Feet	Base Period Average Consumptive Use in Acre-Feet
Urban	1,100	1.7	1,900	---
Irrigated Land	7,300	2.5	18,300	18,200
Non-Irrigated Land	800	1.6	1,300	1,300
Farmstead	30	2.0	100	---
Miscellaneous	---	---	---	800
TOTAL	9,230		21,600	20,300

Llagas Ground Water Basin

Land Use	Area in Acres in 1961-62	Unit Consumptive Water Use In Feet	1961-62 Consumptive Use in Acre-Feet	Base Period Average Consumptive Use in Acre-Feet
Urban	6,100	1.7	10,400	1,400
Irrigated Land	35,400	2.5	88,400	66,700
Non-Irrigated Land	14,400	1.4	20,200	27,800
Farmstead	400	2.0	900	1,200
Miscellaneous	1,000	0.7	700	2,900
TOTAL	57,300		120,600	100,000

* About 14,000 acres of marsh lands and water surface area not included

in 1961-62 it was about 700 acre-feet.

Summary

As previously mentioned, the water supply to Santa Clara County is used to supply the requirements for water. As shown in Table 4 the sum of the items of disposal exceed the sum of the items of supply thereby indicating a withdrawal of water from storage. This loss of storage is confirmed by the drop in the ground water table. The amount of this loss and its effects will be discussed in the next chapter.

TABLE 4

SUMMATION OF THE ITEMS OF WATER SUPPLY AND WATER DISPOSAL TO THE ZONES OR GROUND WATER BASINS OF SANTA CLARA COUNTY
For 1961-62
in Acre-Feet

Item	Ground Water Basin			Totals
	Zone W-1	Coyote	Llagas	
Water Supply				
Precipitation	219,900	14,500	94,100	328,500
Stream & Surface Inflow	180,600	67,600	57,700	305,900
Subsurface Inflow	27,800	4,300	14,200	46,300
Import	10,400	0	0	10,400
Subtotal (to be added)	438,700	86,400	166,000	691,100
Water Disposal				
Consumptive Use	341,900	21,600	120,600	484,100
Stream Outflow	81,000	47,100	39,100	167,200
Subsurface Outflow	0	18,500	15,100	33,600
Export (sewage)	57,500	0	700	58,200
Subtotal (to be subtracted)	480,400	87,200	175,500	743,100
Total*	(-) 41,700	(-) 800	(-) 9,500	(-) 52,000

*(-) indicates loss in storage

GROUND WATER CONDITIONS

The seasonal variations in water supply are regulated naturally by the large volumes of storage space in the ground water basins of Santa Clara County. As ground water is extracted from storage to meet water demands in excess of the average water supply, the ground water table lowers. A long time lowering of the ground water table indicates that ground water overdraft conditions exist and that the seasonal safe yield of the water supply has been exceeded. Such a condition exists in the ground water basins of Santa Clara County. In this chapter the ground water conditions will be noted and the amount of ground water overdraft derived.

Present and historical ground water conditions in the zones or ground water basins of Santa Clara County are reflected in continuous records of the elevation of ground water in wells. The net accumulated effect of ground water supply and disposal is shown by the changes from one year to another in the elevation of the ground water table. In the free or unconfined ground water areas, a change in the elevation of the water in a well reflects a change in storage while a similar change in the elevation of water in a well in a pressure or confined area generally reflects the lack of capacity of the ground water bearing strata to transport water from the forebay or recharge area to the point of disposal (wells). In the Santa Clara Valley and Llagas Ground Water Basins there are areas of confined ground water where changes in the elevation of water in deep wells does not indicate significant changes in ground water storage in the vicinity of the particular ground water elevation measurement.

Changes in the elevations of ground water in wells over a period of time at two locations in the Santa Clara Valley Ground Water Basin are shown on Plate 3, "Elevation of Ground Water in Wells." The location of these wells are shown on Plate 4 "Ground Water Contours, Fall 1962." As will be noticed from Plate 3, ground water elevations at well No. 7S/1E-35E in the forebay area have generally declined since 1958 at a rate of about eight feet per year. This represents a decrease in the amount of ground water in storage. However, well No. 6S/1W-27P in the pressure area demonstrates a more rapid rate of decline in the pressure surface, about 13 feet per year. This indicates that the present level of extractions of ground water from the pressure area requires a very steep slope in the water table or pressure surface to get the water from the area of recharge to the point of use. The only way that these pressure levels can be restored is to reduce the extractions in the pressure area to some amount that can be transmitted from the forebay under a flatter water table or pressure surface slope.

The configuration of the ground water table or pressure surface is indicated by the contours on Plate 4. Ground water moves down slope perpendicular to the contours. The contours indicate inflow to the Santa Clara Valley Ground Water Basin from all directions, including San Francisco Bay. They also show subsurface movement of ground water southward out of the Llagas Ground Water Basin.

As previously noted, the difference in the elevation of the ground water table from one year to another in a forebay or unconfined area represents a change in ground water storage. If the change in elevation is multiplied by the appropriate specific yield (the amount of water a saturated unit volume of water bearing sediment would yield under the pull of gravity) the result is the change in ground water storage. The accumulated overdraft can be measured in this manner. If the ground water table elevation of 1942 is assumed the desirable condition which would prevent sea water intrusion and halt land subsidence, then the change in ground water storage since that time is the accumulated overdraft.

The accumulated overdraft was computed by determining the average ground water table elevation for each square mile in each ground water basin for 1942 and 1962, subtracting that for

1962 from that for 1942, multiplying the difference by the appropriate specific yield, and accumulating the product with due regard to sign for each ground water basin. The resulting total accumulated overdraft as of the end of the preceding (1961-62) water year for Zone W-1 was about 662,000 acre-feet, for the Coyote Ground Water Basin it was about Zero acre-feet, and for the Llagas Ground Water Basin it was about 25,000 acre-feet.

Since the configuration of the ground water table in 1963 will not be known until measurements of the elevation of ground water in wells in the fall are made, the accumulated overdraft as of the current (1962-63) water year can only be estimated by adding to the accumulated overdraft for the preceding water years the estimated annual overdraft corrected for water that made up the overdraft that cannot be replaced. (Water of compaction as such is non-replaceable water; it became part of the water supply because of lowered pressure levels, but its use results in an undesirable feature, subsidence. Therefore it is part of the overdraft but since this volume of storage is lost through subsidence it is not part of the accumulated overdraft.) The current (1962-63) water year's estimated accumulated overdraft in Zone W-1 is about 703,000 acre-feet, and about 36,000 acre-feet in the Llagas Ground Water Basin.

Over a period of time, a large accumulated loss of ground water from storage represents a condition of ground water overdraft. As previously noted, a ground water basin is in effect a reservoir and serves to regulate the variable water supply over a period of years. In this capacity the elevation of the ground water table is expected to fluctuate, to be higher in periods of "wet" years and lower in periods of "dry" years. However, a lowering of the ground water table beyond that to be expected over a dry period is indicative of an overdraft condition.

For this study, ground water overdraft is defined as the amount of ground water equal to the average annual decrease in the amount of ground water in storage that occurs during a long time period under a particular set of physical conditions affecting the supply, use, and disposal of water in the ground water basin. Therefore, while the accumulated change in ground water storage is indicative of whether or not an overdraft condition exists, it is not a measure of the amount of the overdraft. The overdraft is the average seasonal change in storage that would have occurred over a hydrologic base period if the present (or any particular year's) conditions had existed during that hydrologic base period.

The estimates of overdraft of the zones or ground water basins in Santa Clara County were determined under a selected set of definitions, assumptions, and cultural conditions that appeared to best fit the actual conditions of water supply. In this study the base period to represent the long time average hydrologic conditions was that used in Bulletin 7. For the Santa Clara Valley and Coyote Ground Water Basins the base period was from 1935-36 through 1947-48 and for the Llagas Ground Water Basin from 1932-33 to 1947-48. These base periods were established by an analysis of the precipitation records for the San Jose and Gilroy stations.

The basic equation used was that the water supply must be equal to the water disposal plus or minus a change in storage. The solution to this equation is known as the hydrologic balance; that is, the hydrology of an area is balanced when the summation of the items of water supply is equal to the summation of the items of water disposal plus or minus a change in the amount of water in storage.

The base period hydrologic balance developed in Bulletin 7 for the North Santa Clara Valley area was modified to apply to the boundaries of Zone W-1 and the Coyote Ground Water Basin. The base period hydrologic balance for the Llagas Ground Water Basin developed in Bulletin 7 required no modification for use in this study. Each of the base period hydrologic balances were then adjusted to reflect the conditions as they existed in 1962. This was accomplished by subtracting the average seasonal amounts of each of the items of water supply and water disposal (as developed in the previous chapter) which occurred under the fixed conditions of the present (1962) from the average seasonal amounts of the corresponding items of water supply and water disposal which occurred during the base period under actual conditions. The resulting differences were added to the average seasonal change in the amount of ground water in storage that occurred during the base period under actual conditions. This sum is the seasonal amount of ground water overdraft that would have occurred if present (1962) conditions had existed over the base period. These computations are presented in Tables 5, 6, and 7 for the zones or ground water basins of Santa Clara County.

In the Coyote Ground Water Basin computations for the average seasonal overdraft under present (1962) conditions indicated a small overdraft. This computed overdraft was based on the decrease in ground water storage that occurred during the base period. Exclusive of this change in ground water storage, the hydrologic equation is essentially in balance; that is, water supply is sufficient to provide for the water disposal (See Table 4). Since the present (1962) elevation of the ground water table is deemed desirable for the agricultural pursuits of the area, the overdraft cannot be based on the change in ground water storage represented by the lowering of the ground water table to its present elevation. Therefore, under the present

Table 5
ESTIMATE OF SEASONAL OVERDRAFT IN ZONE W-1
Under 1962 Conditions*
(In Acre Feet)

Items of Water Supply, Use and Disposal	Mean Seasonal Amount Under 1962 Conditions	Average Seasonal Amount Under Actual Conditions	Difference	Change in Storage
Average Seasonal Change in Storage During Base Period Under Actual Conditions				(-) 15,800
Surface & Subsurface Inflow				
Precipitation	219,900	219,900	0	
Stream & Overland Surface	171,900	171,900	0	
Imported Water	10,400	1,200	9,200	
Subsurface Inflow	27,800	22,300	5,500	
Waste Water Inflow	8,700	8,700	0	
SUBTOTAL (To be Added)	438,700	424,000	14,700	(+) 14,700
Surface & Subsurface Outflow				
Consumptive Use of Applied Water & Precipitation	341,900	314,500	27,400	
Stream & Overland Surface	81,000	113,300	(-) 32,300	
Exported Water	0	0	0	
Subsurface Outflow	0	0	0	
Waste Water Outflow	57,500	12,000	45,500	
SUBTOTAL (To be Subtracted)	480,400	439,800	40,600	(-) 40,600
SEASONAL OVERDRAFT (Mean Seasonal Change in Storage During Base-Period Under 1962 Conditions)				(-) 41,700

*Estimate based on the assumption that the 13 year base period 1935-36 through 1947-48 is equal to a period of long-time water supply.

Table 6
ESTIMATE OF SEASONAL OVERDRAFT IN THE COYOTE GROUND WATER BASIN UNDER 1962 CONDITIONS*
(In Acre Feet)

Items of Water Supply, Use and Disposal	Mean Seasonal Amount Under 1962 Conditions	Average Seasonal Amount Under Actual Conditions	Difference	Change in Storage
Average Seasonal Change in Storage During Base Period Under Actual Conditions				(-) 700
Surface & Subsurface Inflow				
Precipitation	14,500	14,500	0	
Stream & Overland Surface	67,000	67,000	0	
Imported Water	0	0	0	
Subsurface Inflow	4,300	4,300	0	
Waste Water Inflow	600	500	100	
SUBTOTAL (To be Added)	86,400	86,300	100	(+) 100
Surface & Subsurface Outflow				
Consumptive Use of Applied Water & Precipitation	21,600	20,300	1,300	
Stream & Overland Surface	47,100	55,100	(-)8,000	
Exported Water	0	0	0	
Subsurface Outflow	18,500	11,600	6,900	
Waste Water Outflow	0	0	0	
SUBTOTAL (To be Subtracted)	87,200	87,000	200	(-) 200
SEASONAL OVERDRAFT (Mean Seasonal Change in Storage During Base-Period) Under 1962 Conditions)				(-) 800

*Estimate based on the assumption that the 13 year base period 1935-36 through 1947-48 is equal to a period of long-time water supply.

Table 7
ESTIMATE OF SEASONAL OVERDRAFT IN THE LLAGAS GROUND WATER BASIN UNDER 1962 CONDITIONS*
(In Acre Feet)

Items of Water Supply, Use and Disposal	Mean Seasonal Amount Under 1962 Conditions	Average Seasonal Amount Under Actual Conditions	Difference	Change in Storage
Average Seasonal Change in Storage During Base Period Under Actual Conditions				(-) 900
Surface & Subsurface Inflow				
Precipitation	94,000	94,000	0	
Stream & Overland Surface	57,100	57,100	0	
Imported Water	0	0	0	
Subsurface Inflow	14,200	16,800	1,400	
Waste Water Inflow	600	500	100	
SUBTOTAL (To be Added)	166,000	164,500	1,500	(+) 1,500
Surface & Subsurface Outflow				
Consumptive Use of Applied Water & Precipitation	120,600	100,000	20,600	
Stream & Overland Surface	39,100	49,800	(-) 10,700	
Exported Water	0	0	0	
Subsurface Outflow	15,100	15,100	0	
Waste Water Outflow	700	500	200	
SUBTOTAL (To be Subtracted)	175,500	165,400	10,100	(-)10,100
SEASONAL OVERDRAFT (Mean Seasonal Change in Storage During Base-Period) Under 1962 Conditions)				(-) 9,500

*Estimate based on the assumption that the 16 year base period 1932-33 through 1947-48 is equal to a period of long-time water supply.

(1962) conditions there is no ground water overdraft in the Coyote Ground Water Basin, nor, for the same reason, is there any accumulated overdraft.

From these calculations it is apparent that ground water overdrafts existed in two of the three major ground water basins of Santa Clara County. The average seasonal ground water overdraft under 1962 conditions in Zone W-1 was 41,700 acre-feet, in the Coyote Ground Water Basin it was zero acre-feet, and in the Llagas Ground Water Basin it was 9,500 acre-feet.

Section 26.5 of the District Act directs that in addition to a determination of the overdraft for the previous water year, an estimate be made of the overdraft for the current and succeeding water years. These estimates were prepared in the same fashion as described for the preceding water year. The only item of water supply that could be expected to change is the amount of imported water and for water disposal is the amount of consumptive use. These items were estimated on the bases of historical information projected to the current (1962-63) and succeeding (1963-64) water years. The calculations are shown on Tables 8, 9, and 10 for 1962-63 and Tables 11, 12, and 13 for 1963-64. The actual average annual and estimated future ground water overdraft as determined herein for the zones or ground water basins of Santa Clara County are summarized on Table 14.

Table 8
ESTIMATE OF SEASONAL OVERDRAFT IN ZONE W-1 UNDER 1963 CONDITIONS*
(In Acre Feet)

Items of Water Supply, Use and Disposal	Mean Seasonal Amount Under 1963 Conditions	Average Seasonal Amount Under Actual Conditions	Difference	Change in Storage
Average Seasonal Change in Storage During Base Period Under Actual Conditions				(-) 15,800
Surface & Subsurface Inflow				
Precipitation	219,900	219,900	0	
Stream & Overland Surface	171,900	171,900	0	
Imported Water	12,700	1,200	11,500	
Subsurface Inflow	27,800	22,300	5,500	
Waste Water Inflow	8,700	8,700	0	
SUBTOTAL (To be Added)	441,000	424,000	17,000	(+) 17,000
Surface & Subsurface Outflow				
Consumptive Use of Applied Water & Precipitation	343,000	314,500	28,500	
Stream & Overland Surface	81,000	113,300	(-) 32,300	
Exported Water	0	0	0	
Subsurface Outflow	0	0	0	
Waste Water Outflow	57,600	12,000	45,600	
SUBTOTAL (To be Subtracted)	481,600	439,800	41,800	(-) 41,800
SEASONAL OVERDRAFT (Mean Seasonal Change in Storage During Base Period Under 1963 Conditions)				(-) 40,600

*Estimate based on the assumption that the 13 year base period 1935-36 through 1947-48 is equal to a period of long-time water supply.

Table 9
ESTIMATE OF SEASONAL OVERDRAFT IN THE COYOTE GROUND WATER BASIN UNDER 1963 CONDITIONS*

(In Acre Feet)

Items of Water Supply, Use and Disposal	Mean Seasonal Amount Under 1963 Conditions	Average Seasonal Amount Under Actual Conditions	Difference	Change in Storage
Average Seasonal Change in Storage During Base Period Under Actual Conditions				(-) 700
Surface & Subsurface Inflow				
Precipitation	14,500	14,500	0	
Stream & Overland Surface	67,000	67,000	0	
Imported Water	0	0	0	
Subsurface Inflow	3,400	3,400	0	
Waste Water Inflow	600	500	100	
SUBTOTAL (To be Added)	86,400	86,300	100	(+) 100
Surface & Subsurface Outflow				
Consumptive Use of Applied Water & Precipitation	21,900	20,300	1,600	
Stream & Overland Surface	47,100	55,100	(-) 8,000	
Exported Water	0	0	0	
Subsurface Outflow	18,500	11,600	6,900	
Waste Water Outflow	0	0	0	
SUBTOTAL (To be Subtracted)	87,500	87,000	(+) 500	(-) 500
SEASONAL OVERDRAFT (Mean Seasonal Change in Storage During Base Period Under 1963 Conditions)				(-) 1,100

*Estimate based on the assumption that the 13 year base period 1935-36 through 1947-48 is equal to a period of long-time water supply.

Table 10
ESTIMATE OF SEASONAL OVERDRAFT IN THE LLAGAS GROUNDWATER BASIN UNDER 1963 CONDITIONS*

(In Acre-Feet)

Items of Water Supply, Use and Disposal	Mean Seasonal Amount Under 1963 Conditions	Average Seasonal Amount Under Actual Conditions	Difference	Change in Storage
Average Seasonal Change in Storage During Base Period Under Actual Conditions				(-) 900
Surface & Subsurface Inflow				
Precipitation	94,100	94,100	0	
Stream & Overland Surface	57,100	57,100	0	
Imported Water	0	0	0	
Subsurface Inflow	14,200	12,800	1,400	
Waste Water Inflow	600	500	100	
SUBTOTAL (To be Added)	166,000	164,500	1,500	(+) 1,500
Surface & Subsurface Outflow				
Consumptive Use of Applied Water & Precipitation	121,900	100,000	21,900	
Stream & Overland Surface	39,100	49,800	(-) 10,700	
Exported Water	0	0	0	
Subsurface Outflow	15,100	15,100	0	
Waste Water Outflow	700	500	200	
SUBTOTAL (To be Subtracted)	176,800	165,400	11,400	(-) 11,400
SEASONAL OVERDRAFT (Mean Seasonal Change in Storage During Base Period Under 1963 Conditions)				(-) 10,800

*Estimate based on the assumption that the 16 year base period 1932-33 through 1947-48 is equal to a period of long-time water supply.

Table 11
ESTIMATE OF SEASONAL OVERDRAFT IN ZONE W-1 UNDER 1964 CONDITIONS*

(In Acre-Feet)

Items of Water Supply, Use and Disposal	Mean Seasonal Amount Under 1964 Conditions	Average Seasonal Amount Under Actual Conditions	Difference	Change in Storage
Average Seasonal Change in Storage During Base Period Under Actual Conditions				(-) 15,800
Surface & Subsurface Inflow				
Precipitation	219,900	219,900	0	
Stream & Overland Surface	171,900	171,900	0	
Imported Water	14,700	1,200	13,500	
Subsurface Inflow	27,800	22,300	5,500	
Waste Water Inflow	8,700	8,700	0	
SUBTOTAL (To be Added)	443,000	424,000	19,000	(+) 19,000
Surface & Subsurface Outflow				
Consumptive Use of Applied Water & Precipitation	344,500	314,500	30,500	
Stream & Overland Surface	81,000	113,300	(-) 32,300	
Exported Water	0	0	0	
Subsurface Outflow	0	0	0	
Waste Water Outflow	57,700	12,000	45,700	
SUBTOTAL (To be Subtracted)	483,200	439,800	43,400	(-) 43,400
SEASONAL OVERDRAFT (Mean Seasonal Change in Storage During Base Period Under 1964 Conditions)				(-) 40,200

*Estimate based on the assumption that the 13 year base period 1935-36 through 1947-48 is equal to a period of long-time water supply.

Table 12
ESTIMATE OF SEASONAL OVERDRAFT IN THE COYOTE GROUND WATER BASIN UNDER 1964 CONDITIONS*
(In Acre-Feet)

Items of Water Supply, Use and Disposal	Mean Seasonal Amount Under 1964 Conditions	Average Seasonal Amount Under Actual Conditions	Difference	Change in Storage
Average Seasonal Change in Storage During Base Period Under Actual Conditions				(-) 700
Surface & Subsurface Inflow				
Precipitation	14,500	14,500	0	
Stream & Overland Surface	67,000	67,000	0	
Imported Water	0	0	0	
Subsurface Inflow	4,300	4,300	0	
Waste Water Inflow	700	500	200	
SUBTOTAL (To be Added)	86,500	86,300	200	(+) 200
Surface & Subsurface Outflow				
Consumptive Use of Applied Water & Precipitation	22,300	20,300	2,000	
Stream & Overland Surface	47,100	55,100	(-) 8,000	
Exported Water	0	0	0	
Subsurface Outflow	18,500	11,600	6,900	
Waste Water Outflow	0	0	0	
SUBTOTAL (To be Subtracted)	87,900	87,000	900	(-) 900
SEASONAL OVERDRAFT (Mean Seasonal Change in Storage During Base Period Under 1964 Conditions)				(-) 1,400

*Estimate based on the assumption that the 13 year base period 1935-36 through 1947-48 is equal to a period of long-time water supply

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Table 13
ESTIMATE OF SEASONAL OVERDRAFT IN THE LLAGAS GROUND WATER BASIN UNDER 1964 CONDITIONS*
(In Acre-Feet)

Items of Water Supply, Use and Disposal	Mean Seasonal Amount Under 1964 Conditions	Average Seasonal Amount Under Actual Conditions	Difference	Change in Storage
Average Seasonal Change in Storage During Base Period Under Actual Conditions				(-) 900
Surface & Subsurface Inflow				
Precipitation	94,100	94,100	0	
Stream & Overland Surface	57,100	57,100	0	
Imported Water	0	0	0	
Subsurface Inflow	14,200	12,800	1,400	
Waste Water Inflow	600	500	100	
SUBTOTAL (To be Added)	166,000	164,500	1,500	(+) 1,500
Surface & Subsurface Outflow				
Consumptive Use of Applied Water & Precipitation	123,200	100,000	23,200	
Stream & Overland Surface	39,100	49,800	(-) 10,700	
Exported Water	0	0	0	
Subsurface Outflow	15,100	15,100	0	
Waste Water Outflow	700	500	200	
SUBTOTAL (To be Subtracted)	178,100	165,400	12,700	(-) 12,700
SEASONAL OVERDRAFT (Mean Seasonal Change in Storage During Base Period Under 1964 Conditions)				(-) 12,100

*Estimate based on the assumption that the 16 year base period 1932-33 through 1947-48 is equal to a period of long-time water supply.

The average annual overdraft for the immediate past 10 water years is a measure of recent historical events in the water supply and water disposal of the zones or ground water basins of Santa Clara County. Rather than develop a separate hydrologic balance for each year of the 10 year period, the integrated effects of the accumulated overdraft method was used. The change in ground water storage between 1952 and 1962 was computed as previously discussed for the accumulated overdraft and found to be about 213,000 acre-feet for the major ground water basins of Santa Clara County. The individual basin changes for the 10 year period are shown in Table 15. Dividing this accumulated change in ground water storage by 10 gives an approximate measure of the actual average annual overdraft for the immediate past 10 years. These averages are also shown in Table 15.

TABLE 14

ESTIMATED AVERAGE SEASONAL GROUND WATER OVERDRAFT
FOR ZONES OR GROUND WATER BASINS OF SANTA CLARA COUNTY
in Acre-Feet

Ground Water Basin	Average Annual Ground Water Overdraft		
	1961-62	1962-63	1963-64
Zone W-1	41,700	40,600	40,200
Coyote	0	400	700
Llagas	9,500	10,800	12,100

TABLE 15

ESTIMATED CHANGE IN GROUND WATER STORAGE BETWEEN 1952 AND 1962 AND AVERAGE ANNUAL CHANGE IN STORAGE (WATER SUPPLY DEFICIENCY OR OVERDRAFT) FOR ZONES OR GROUND WATER BASINS OF SANTA CLARA COUNTY

Values in Acre-Feet

Ground Water Basin	Change in Ground Water Storage, 1952-1962	Average Annual Overdraft
Zone W-1	195,000	19,500
Coyote	0	0
Llagas	18,000	1,800
Total	213,000	21,300

It should be pointed out that over the past 10 year period the accumulated change in ground water storage occurred during a time when the average seasonal precipitation was greater than that for the 1942-62 period. Therefore, the average water supply condition was such that the net drop in ground water levels was not large. Since the short term period reflects the average conditions for that period and does not necessarily represent the long term average period or any other period, the short term accumulated overdraft and average annual overdraft as presented above cannot be correlated with or compared to the long term overdraft criteria.

Ground Water Extractions

While ground water supplies provide for the large majority of the beneficial uses in Santa Clara County, the amount of ground water extraction is not a necessary item of the hydrologic equation. This anomaly occurs because ground water extraction is an item of water supply and also an item of disposal from the ground water reservoir; as a result it would appear on both sides of the hydrologic equation and automatically cancels.

However, the amount of ground water extraction is a necessary item to the management of a ground water basin. If the ground water overdraft is to be reduced in the most effective manner, extractions should be reduced in those areas where the capability of the aquifier to transmit water is low. The amount of reduction depends on the ground water table slope desired, and the total amount of ground water extraction in the vicinity.

In order to provide reliable data on the location and amount of ground water extraction records of ground water production should be kept. In general this has not been done for any of the agricultural uses; only some of the industrial uses and mutual water companies have adequate records, but fortunately the large private water companies (public utilities) and municipal water systems do keep good records. In the future, records of ground water extraction for all uses will be improved as a result of the ground water charge to be placed on all ground water produced in Zone W-1. Attempts should be made to improve the records for the other ground water basins to facilitate planning for future water importation and improved ground water basin management.

Based on the acreage of land irrigated, type of crop, and an assumed irrigation efficiency, it is possible to estimate the amount of ground water extracted for agricultural use. Utilizing the records of the public utilities and municipal water systems and adding a small percentage for unmetered ground water production outside of those systems, it is possible to estimate the amount of ground water extracted for urban (municipal and industrial) use. By these methods, the ground water extraction for past years was estimated and extended by proportional projection to the current and ensuing water years. These amounts of estimated ground water extraction are shown in Table 16.

TABLE 16

ESTIMATED SEASONAL GROUND WATER EXTRACTIONS IN THE ZONES OR GROUND WATER BASINS OF SANTA CLARA COUNTY

in Acre-Feet

Ground Water Basin	Zone W-1	Coyote	Llagas	Total
1961-62				
Agricultural Use	124,000	13,000	64,000	201,000
Urban Use	126,000	2,000	9,000	137,000
Total	250,000	15,000	73,000	338,000
1962-63				
Agricultural Use	123,000	13,000	65,000	201,000
Urban Use	128,000	2,000	10,000	140,000
Total	251,000	15,000	75,000	341,000
1963-64				
Agricultural Use	121,000	13,000	65,000	199,000
Urban Use	132,000	3,000	11,000	146,000
Total	253,000	16,000	76,000	345,000

WATER IMPORTATION PROGRAM

In the preceding chapter it was estimated that the average annual ground water overdraft in Santa Clara County in the current (1962-63) water year will be about 51,800 acre-feet and that by the end of the current (1962-63) water year the accumulated ground water overdraft will amount to about 739,000 acre-feet. The fact that ground water overdraft conditions have existed for some time is well known. As indicated by the descending line of the accumulated departure from the average seasonal precipitation on Plate 2, the period from 1917 to 1935 was a period of dryness or below average rainfall. This "drought" caused enough concern over the water supply problem to permit the formation of the Santa Clara Valley Water Conservation District in 1929. That district immediately began conservation activities and by 1935 had completed its first conservation reservoir. The conservation measures and the "wet" period of above average rainfall from 1935 to 1942 resulted in an essentially full ground water reservoir in 1942.

However, these efforts at conserving the local water supply could not keep up with the increasing demand for water. The descending line on Plate 2 for the period between 1942 and 1950 is not as extensive as the period between 1917 and 1935 indicating that the 1942-50 "dry" period was less severe. And yet the ground water table reached an all time low in 1950. Clearly the local water supply is insufficient to provide for the demands made upon it.

Recognizing this fact the Board of Supervisors of the Santa Clara County Flood Control and Water Conservation District contracted with the State of California for a supplemental water supply of 88,000 acre-feet per year. The initial delivery of this new supply of water is to be made in 1964 from the South Bay Aqueduct, which is now under construction. In order to put this water to the most efficient use some will be delivered to the facilities of the Santa Clara Valley Water Conservation District for recharge of the ground water supplies. The remainder will be treated and delivered to water retail agencies for direct surface delivery to consumers. This is an essential part of the ground water management program to relieve the overdraft on the ground water basin caused by the inadequate transmission capacity of its aquifers.

Based on the average annual overdraft and accumulated overdraft described in the preceding chapter, supplemental water should be imported this year to alleviate these undesirable conditions. Based on the 1963-64 estimates of overdraft about 53,000 acre-feet of supplemental water should be imported if available and, in addition, about 20,000 acre-feet of water should be imported to help alleviate the accumulated overdraft (planned elimination in 30 years). However, no supplemental water will be available to the district until the 1964-65 water year.

To pay for Santa Clara County's share of the South Bay

Aqueduct and the in-county distribution system required to service this imported water, a limited county-wide ad valorem tax and a ground water charge on water extracted within Zone W-1 will be levied. In addition, charges for the treated water will be made that will repay all the costs of the treatment plants, their operation and maintenance, their share of the in-county distribution system costs, and the assigned ground water charge. The Board of Supervisors have adopted a plan to limit the ad valorem tax to five cents per $100 of assessed valuation and to fix the ground water charge for water extracted from the ground water supplies of Zone W-1 for agricultural use to $5.00 per acre-foot. The ground water charge on water extracted from the ground water supplies of Zone W-1 for any use other than agricultural (termed municipal and industrial water use), will vary according to the anticipated expenditures and revenues from the other sources. Should the total anticipated revenues from all sources exceed the anticipated expenditures in any year, the ad valorem tax will be reduced to zero before the ground water charge is reduced below $5.00 per acre-foot for agricultural water or $10.00 per acre-foot for municipal and industrial water.

Since the South Bay Aqueduct is under construction, payment must be made to the Statefor Santa Clara County's share in the construction and maintenance of completed portions of the aqueduct.

No payments were made to the State prior to July 1, 1962. During the current (1962-63) water year payments of about $315,400 will be made to the State. It is anticipated that during the ensuing (1963-64) water year payments of about $809,000 will have to be made to the State.

The engineering and construction costs of the in-county distribution system will be paid for from the proceeds of a bond issue which will be repaid from the ground water charges plus special charges for treated water. The costs of the South Bay Aqueduct will be paid by the ad valorem tax. If a five cent per $100 assessed valuation ad valorem tax were levied and collected for the ensuing (1963-64) water year, it is estimated that about $720,000 would be obtained. With the estimated carryover of ad valorem taxes collected in previous years there will be sufficient funds to pay the State charges and maintain a limited reserve for the future years when payments to the State will be even larger.

The registration of wells in the zone of benefit began on February 11, 1963 with the formation of Zone W-2, coterminous with Zone W-1, as a prerequisite to the levy and collection of a ground water charge. Since the work of registration, location, and determination of production quantities cannot be completed until late in the ensuing (1963-64) water year, no ground water charge could be collected in the ensuing (1963-64) water year.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

Pursuant to Section 26.5 of the Santa Clara County Flood Control and Water Conservation District Act, an investigation of the ground water conditions of the District and Zones thereof has been completed. This chapter presents a summary of the findings derived from the results of this investigation and recommendations based upon these findings.

Summary of Findings

1. The major ground water basins of Santa Clara County are the Santa Clara Valley Ground Water Basin in the northern portion of the County, the Coyote Ground Water Basin in the center of the County, and the Llagas Ground Water Basin in the southern portion of the County.

2. A water importation zone, Zone W-1, was established on September 11, 1962. It includes most of the Santa Clara Valley Ground Water Basin within its boundaries.

3. The average seasonal water supply available to the zones or ground water basins of Santa Clara County under present (1962) conditions is:

Zone W-1	438,700 acre-feet
Coyote G.W.B.	86,400 acre-feet
Llagas G.W.B.	166,000 acre-feet

4. The average seasonal water disposal including consumptive use in the zones or ground water basins of Santa Clara County under

present (1962) conditions is:

Zone W-1	480,000 acre-feet
Coyote G.W.B.	87,200 acre-feet
Llagas G.W.B.	175,500 acre-feet

5. Under the present (1962) conditions of water supply and water disposal, overdraft conditions exist in two of the three major ground basins of Santa Clara County. The average seasonal overdraft in acre-feet for the preceding (1961-62), current (1962-63) and ensuing (1963-64) water years is estimated to be:

Zone W-1	41,700	40,600	40,200
Coyote G.W.B.	0	400	700
Llagas G.W.B.	9,500	10,800	12,100

6. The accumulated overdraft represented by the change in ground water storage between the ground water table elevation in 1942 (assumed desirable) and 1962 is estimated to be:

Zone W-1	662,000 acre-feet
Coyote G.W.B.	0 acre-feet
Llagas G.W.B.	25,000 acre-feet

7. The primary source of water put to beneficial use in the zones or ground water basins of Santa Clara County is ground water and the total extractions in acre-feet of ground water during the preceding (1961-62), current (1962-63) and ensuing (1963-64) water years is estimated to be:

Zone W-1	250,000	251,000	253,000
Coyote G.W.B.	15,000	15,000	16,000
Llagas G.W.B.	73,000	75,000	76,000

8. The estimated amount of ground water to be extracted for agricultural use from the zones cr ground water basins of Santa Clara County during the ensuing (1963-64) water year is:

Zone W-1	121,000 acre-feet
Coyote G.W.B.	13,000 acre-feet
Llagas G.W.B.	65,000 acre-feet

9. The estimated amount of ground water to be extracted for uses other than agricultural use from the zones or ground water basins of Santa Clara County during the ensuing (1963-64) water year is:

Zone W-1	132,000 acre-feet
Coyote G.W.B.	3,000 acre-feet
Llagas G.W.B.	11,000 acre-feet

10. A program for the importation of supplemental water to help alleviate the annual and accumulated ground water overdraft has been formulated and a contract signed with the State to supply a maximum annual amount of 88,000 acre-feet. Initial deliveries are to be made in late 1964 from the South Bay Aqueduct.

11. An in-county distribution system to serve the imported water to the points of ground water recharge and surface delivery treatment plants in Zone W-1 is being designed.

12. Expenditures for Santa Clara County's share of the cost of construction of the South Bay Aqueduct in the ensuing (1963-64) water year are estimated to amount to $809,000.

13. A county-wide ad valorem tax of five cents per $100 assessed valuation together with anticipated carryover from the current water year should provide sufficient revenues in the ensuing (1963-64) water year to meet the anticipated expenditures and provide a limited short term reserve.

14. A ground water charge on the production of water from the ground water supplies in Zone W-1 can not be levied in the ensuing (1963-64) water year since the necessary registration of wells will not be completed.

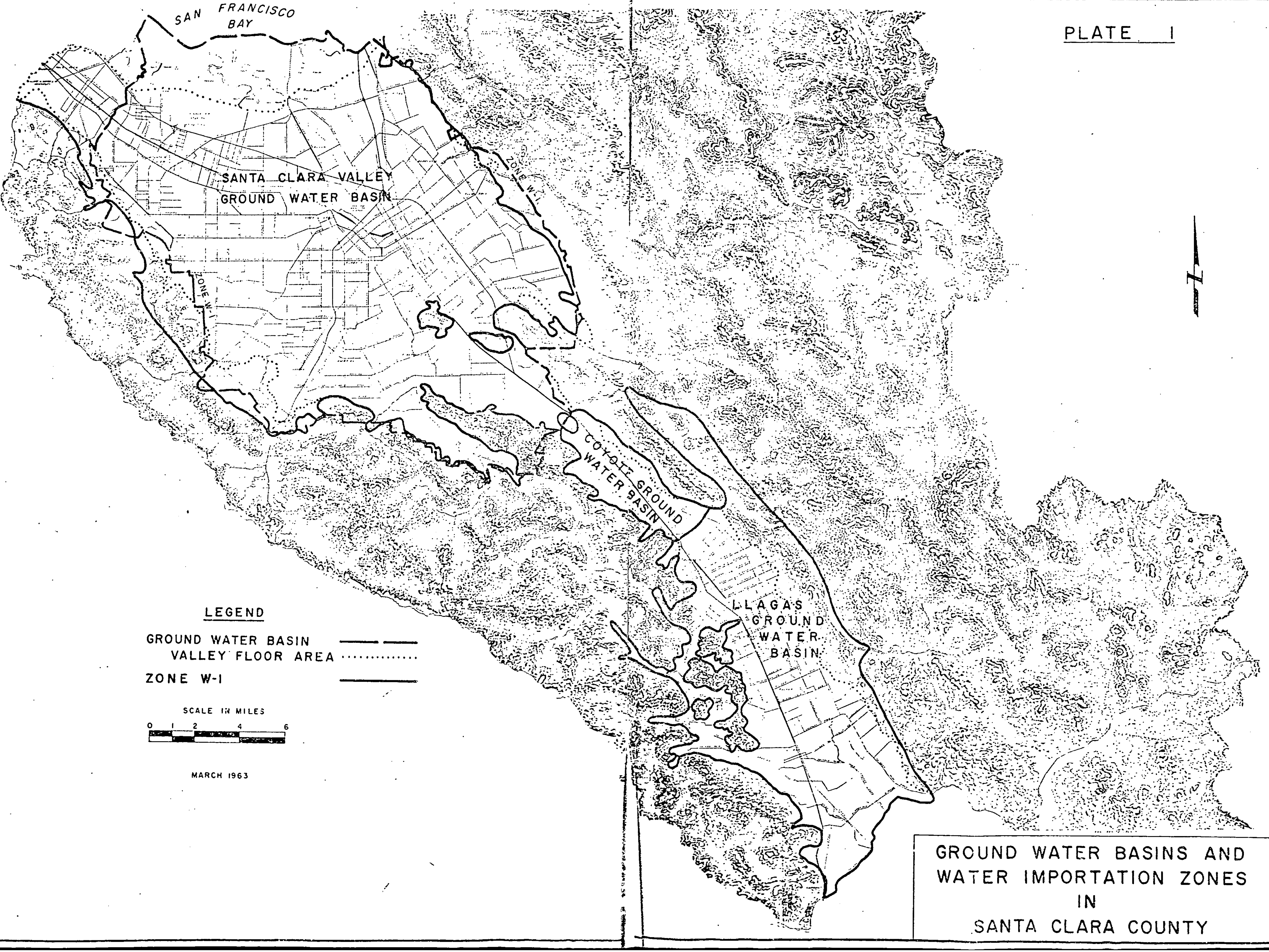
Recommendations

Based on these findings it is recommended:

1. That the district continue expeditiously its engineering design work on the in-county distribution facilities in order to complete the system in time to distribute water imported by the South Bay Aqueduct.

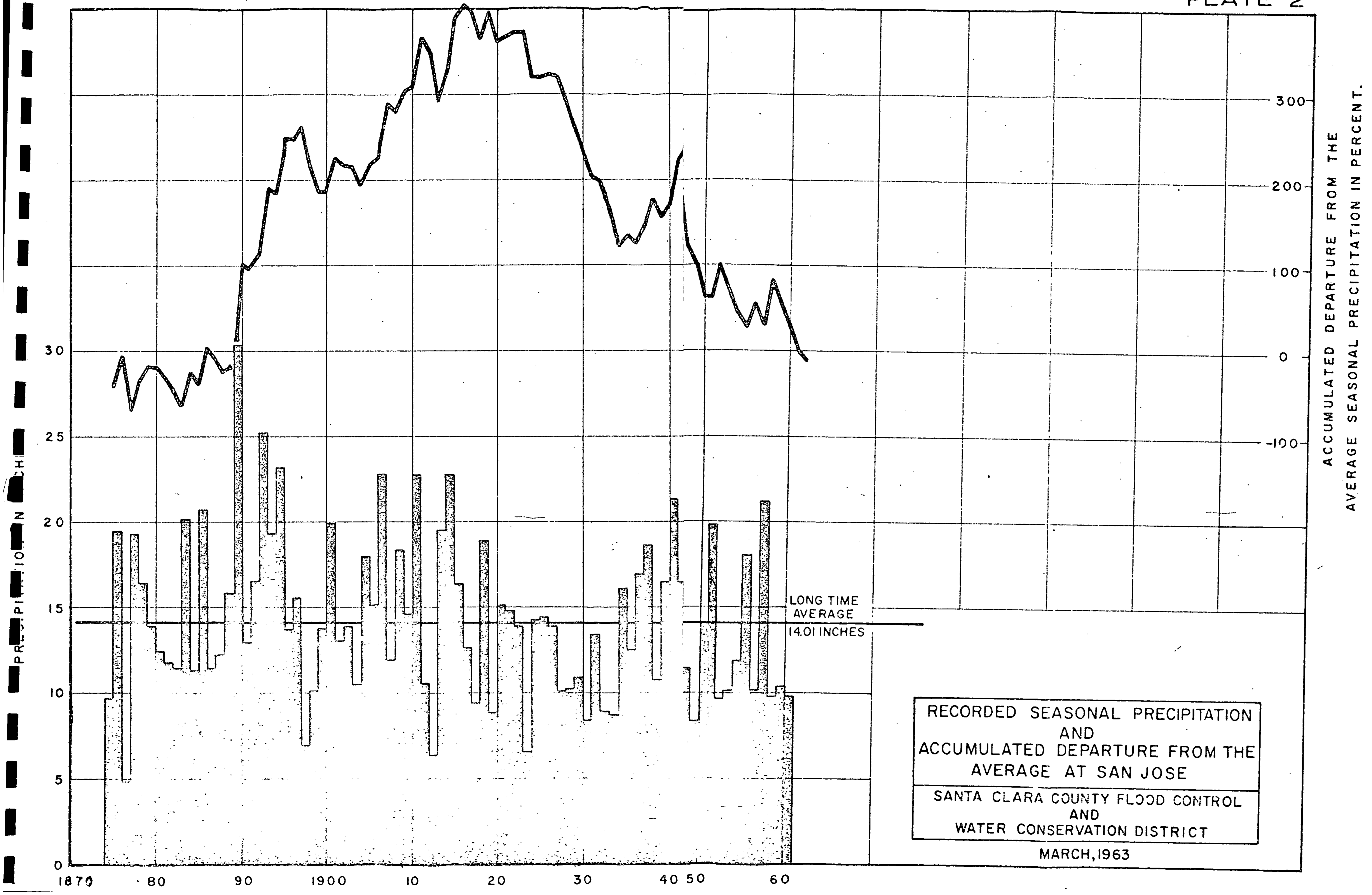
2. That a county-wide ad valorem tax of five cents per $100 assessed valuation be levied for the ensuing (1963-64) water year and collected to pay the anticipated charges for the County's share of the construction of the South Bay Aqueduct.

PLATE I



GROUND WATER BASINS AND WATER IMPORTATION ZONES IN SANTA CLARA COUNTY

PLATE 2

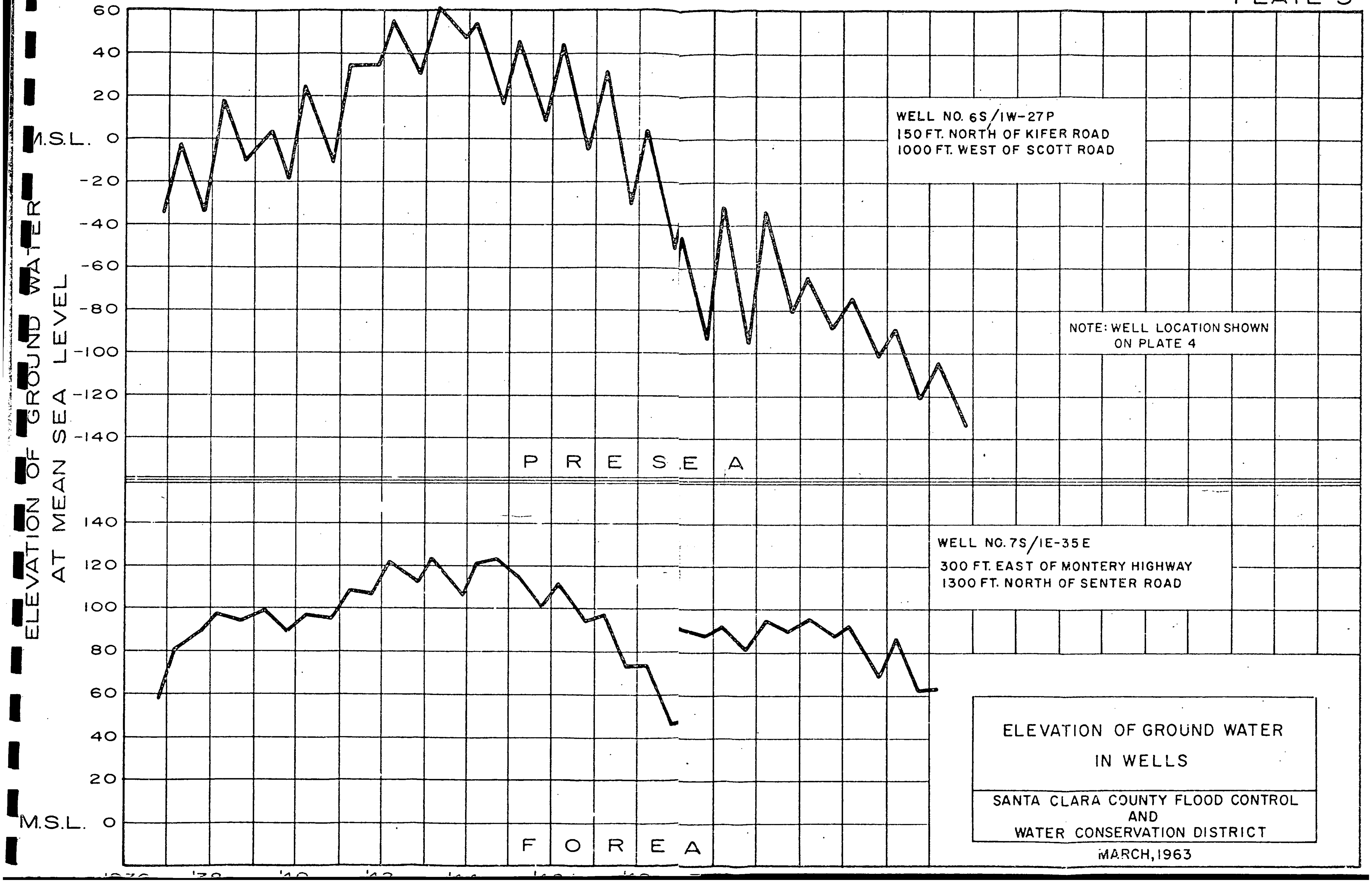


RECORDED SEASONAL PRECIPITATION
AND
ACCUMULATED DEPARTURE FROM THE
AVERAGE AT SAN JOSE

SANTA CLARA COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

MARCH, 1963

PLATE 3

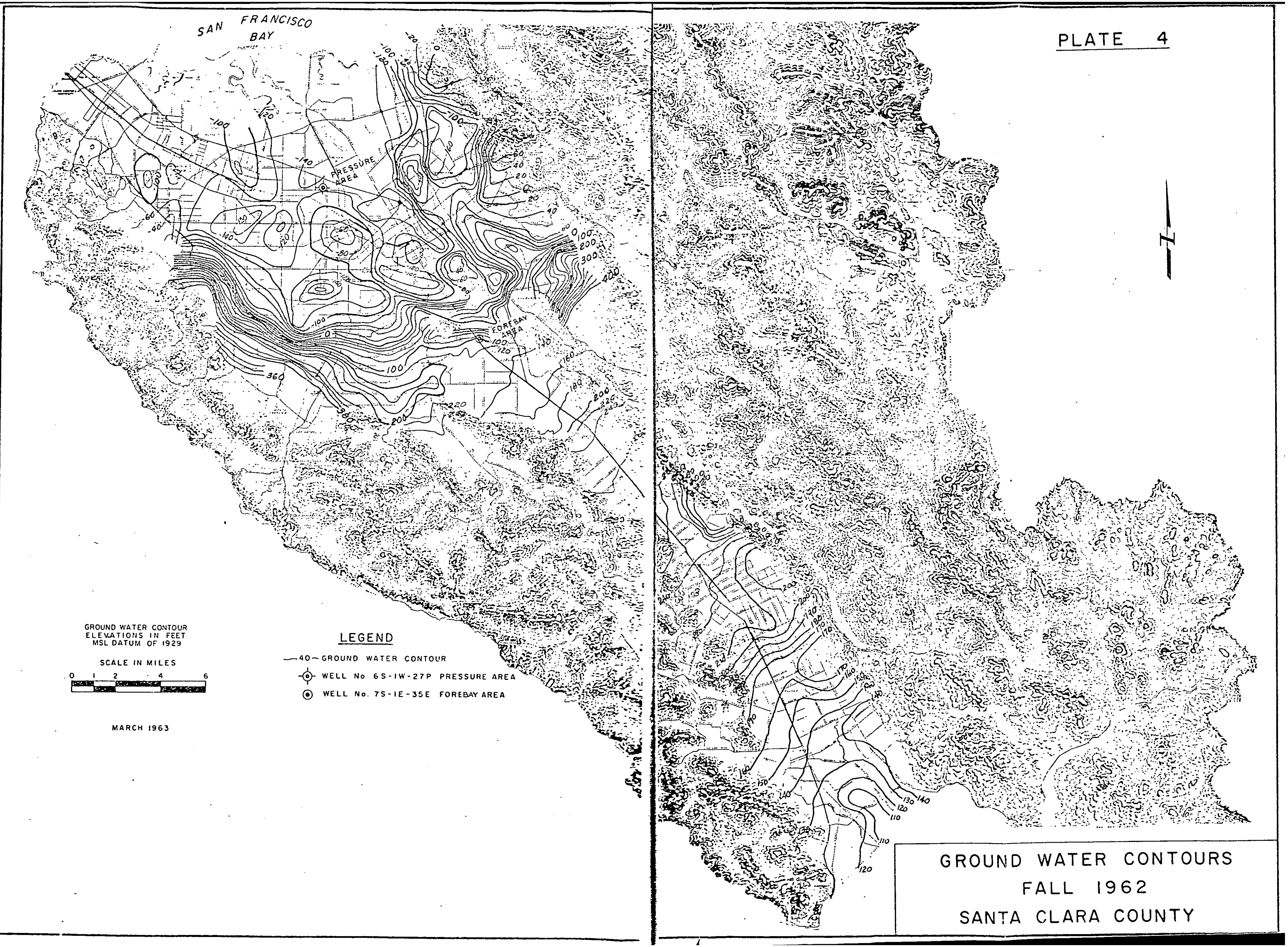


ELEVATION OF GROUND WATER
IN WELLS

SANTA CLARA COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

MARCH, 1963

PLATE 4



GROUND WATER CONTOURS
FALL 1962
SANTA CLARA COUNTY

GROUND WATER CONTOUR
ELEVATIONS IN FEET
MSL DATUM OF 1929

SCALE IN MILES
0 1 2 4 6

LEGEND

- —40— GROUND WATER CONTOUR
- -⊙- WELL No. 6S-1W-27P PRESSURE AREA
- ⊙ WELL No. 7S-1E-35E FOREBAY AREA

MARCH 1963